causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits."

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants that are discharged into the waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the Code of Federal Regulations: 40 C.F.R. section 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 C.F.R. section 122.44(d) requires that permits include water quality-based effluent limitations (WQBEL's) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water where numeric water quality objectives have not been established. The Basin Plan at page IV-17.00 contains an implementation policy, "*Policy for Application of Water Quality Objectives*," which specifies that the Central Valley Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives.*" This policy complies with 40 C.F.R. section 122.44(d)(1). With respect to narrative objectives, the Central Valley Water Board must establish effluent limitations using one or more of three specified sources, including: (1) U.S. EPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Central Valley Water Board's "*Policy for Application of Water Quality Objectives*")(40 C.F.R. § 122.44(d)(1)(vi)(A), (B) or (C)), or (3) an indicator parameter.

The Basin Plan includes numeric site-specific water quality objectives and narrative objectives for toxicity, chemical constituents, discoloration, radionuclides, and tastes and odors. The narrative toxicity objective states: "*All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.*" (Basin Plan at III-8.00) The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituents objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At minimum, "*...water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCL's)*" in Title 22 of CCR. The Basin Plan further states that, to protect all beneficial uses, the Central Valley Water Board may apply limits more stringent than MCL's. The narrative tastes and odors objective states: "*Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.*"

A. Discharge Prohibitions

1. **Prohibition III.A (No discharge or application of waste other than that described in this Order).** This prohibition is based on Water Code section 13260 that requires filing of a ROWD before discharges can occur. The Discharger submitted a ROWD for the discharges described in this Order; therefore, discharges not described in this Order are prohibited.

2. **Prohibition III.B (No bypasses or overflow of untreated wastewater, except under the conditions at 40 C.F.R. section 122.41(m)(4)).** As stated in section I.G of Attachment D, Standard Provisions, this Order prohibits bypass from any portion of the Facility. Federal regulations, 40 C.F.R. section 122.41(m), define "bypass" as the intentional diversion of waste streams from any portion of a treatment facility. This section of the federal regulations, 40 C.F.R. section 122.41(m)(4), prohibits bypass

TENTATIVE ORDER

unless it is unavoidable to prevent loss of life, personal injury, or severe property damage. In considering the Regional Water Board's prohibition of bypasses, the State Water Board adopted a precedential decision, Order WQO 2002-0015, which cites the federal regulations, 40 C.F.R. section 122.41(m), as allowing bypass only for essential maintenance to assure efficient operation.

3. **Prohibition III.C (No controllable condition shall create a nuisance).** This prohibition is based on Water Code section 13050 that requires water quality objectives be established for the prevention of nuisance within a specific area. The Basin Plan prohibits conditions that create a nuisance.

4. **Prohibition III.D (No inclusion of pollutant-free wastewater shall cause improper operation of the Facility's systems).** This prohibition is based on 40 C.F.R. section 122.41 et seq. that requires the proper design and operation of treatment facilities.

5. **Prohibition III.E (No discharge of hazardous waste).** This prohibition is based on CCR, Title 22, section 66261.1 et seq. that prohibits discharge of hazardous waste.

6. **Prohibition III.F (The discharge of advanced-secondary treated wastewater to the Sacramento River at Discharge Point 001 between 15 June and 15 September is prohibited).** The Discharger is prohibited from discharging to the Sacramento River at Discharge Point 001 during the recreation season (15 June through 15 September). This prohibition is retained from Order R5-2012-0085.

7. **Prohibition III.G (Average Dry Weather Flow).** This prohibition is based on the design average dry weather flow treatment capacity rating for the Facility and ensures the Facility is operated within its treatment capacity. Previous Order R5-2012-0085 included flow as an effluent limit based on the Facility design flow. Flow is not a pollutant and therefore has been changed from an effluent limit to a discharge prohibition in this Order, which is an equivalent level of regulation. This Order is not less stringent because compliance with flow as a discharge prohibition will be calculated the same way as the previous Order.

B. Technology-Based Effluent Limitations

1. Scope and Authority

Section 301(b) of the CWA and implementing U.S. EPA permit regulations at 40 C.F.R. section 122.44 require that permits include conditions meeting applicable technology-based requirements, at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 C.F.R. part 133.

Regulations promulgated in 40 C.F.R. section 125.3(a)(1) require technology-based effluent limitations for municipal dischargers to be placed in NPDES permits based on Secondary Treatment Standards or Equivalent to Secondary Treatment Standards.

The Federal Water Pollution Control Act Amendments of 1972 (PL 92-500) established the minimum performance requirements for POTW's [defined in section 304(d)(1)]. Section 301(b)(1)(B) of that Act requires that such treatment works must, as a minimum, meet effluent limitations based on secondary treatment as defined by the U.S. EPA Administrator.

Based on this statutory requirement, U.S. EPA developed secondary treatment regulations, which are specified in 40 C.F.R. part 133. These technology-based

regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH.

2. Applicable Technology-Based Effluent Limitations

a. **BOD_5 and TSS.** Federal regulations at 40 C.F.R. part 133 establish the minimum weekly and monthly average level of effluent quality attainable by secondary treatment for BOD_5 and TSS. In addition, 40 C.F.R. section 133.102, in describing the minimum level of effluent quality attainable by secondary treatment, states that the 30-day average percent removal shall not be less than 85 percent. This Order contains a limitation requiring an average of 85 percent removal of BOD_5 and TSS over each calendar month. This Order requires WQBEL's that are equal to or more stringent than the secondary technology-based treatment described in 40 C.F.R. part 133 (see section IV.C.3.c of the Fact Sheet for a discussion on pathogens, which includes WQBEL's for BOD_5 and TSS).

b. **pH.** The secondary treatment regulations at 40 C.F.R. part 133 also require that pH be maintained between 6.0 and 9.0 standard units. This Order, however, requires more stringent WQBEL's for pH to comply with the Basin Plan's water quality objectives for pH.

Summary of Technology-based Effluent Limitations
Discharge Point 001

Table F-4. Summary of Technology-Based Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Conventional Pollutants						
Biochemical Oxygen Demand (5-day @ 20°C)	mg/L	30[1]	45[1]	--	--	--
	% Removal	85	--	--	--	--
pH	standard units	--	--	--	6.0[1]	9.0[1]
Total Suspended Solids	mg/L	30[1]	45[1]	--	--	--
	% Removal	85	--	--	--	--

[1] More stringent WQBEL's are applicable to the discharge and are included in this Order, as described further in section IV.C.3.c of this Fact Sheet.

C. Water Quality-Based Effluent Limitations (WQBEL's)

1. Scope and Authority

CWA section 301(b) and 40 C.F.R. section 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. This Order contains requirements, expressed as technology equivalence requirements, more stringent than secondary treatment requirements that are necessary to meet applicable water quality standards. The rationale for these requirements, which consist of tertiary treatment or equivalent requirements, is discussed in section IV.C.3 of this Fact Sheet.

Section 122.44(d)(1)(i) of 40 C.F.R. requires that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric

TENTATIVE ORDER

and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBEL's must be established using: (1) U.S. EPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 C.F.R. section 122.44(d)(1)(vi).

The process for determining reasonable potential and calculating WQBEL's when necessary is intended to protect the designated uses of the receiving water, as specified in the Basin Plan, and achieve applicable water quality objectives and criteria that are contained in other state plans and policies, or any applicable water quality criteria contained in the CTR and NTR.

Finally, 40 C.F.R. section 122(d)(1)(vii) requires effluent limits to be developed consistent with any available WLA's developed and approved for the discharge.

2. Applicable Beneficial Uses and Water Quality Criteria and Objectives

The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. In addition, the Basin Plan implements State Water Board Resolution 88-63, which established state policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for MUN.

The Basin Plan on page II-1.00 states: "*Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning...*" and with respect to disposal of wastewaters states that "*...disposal of wastewaters is [not] a prohibited use of waters of the state; it is merely a use which cannot be satisfied to the detriment of beneficial uses.*"

The federal CWA section 101(a)(2) states: "*it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and for recreation in and on the water be achieved by July 1, 1983.*" Federal regulations, developed to implement the requirements of the CWA, create a rebuttable presumption that all waters be designated as fishable and swimmable. Federal regulations, 40 C.F.R. sections 131.2 and 131.10, require that all waters of the state be regulated to protect the beneficial uses of public water supply, protection and propagation of fish, shell fish and wildlife, recreation in and on the water, agricultural, industrial and other purposes including navigation. 40 C.F.R. section 131.3(e) defines existing beneficial uses as those uses actually attained after 28 November 1975, whether or not they are included in the water quality standards. Federal regulation, 40 C.F.R. section 131.10, requires that uses be obtained by implementing effluent limitations, requires that all downstream uses be protected, and states that in no case shall a state adopt waste transport or waste assimilation as a beneficial use for any waters of the United States.

a. **Receiving Water and Beneficial Uses.** Refer to section III.C.1, above, for a complete description of the receiving water and beneficial uses.

b. **Effluent and Ambient Background Data.** The RPA, as described in section IV.C.3 of this Fact Sheet, was based on data collected during the permitted discharge season from September 2014 through June 2017, which includes effluent and ambient background data submitted in SMR's and the ROWD. Effluent monitoring

data for discharges at both Discharge Point 001 (Monitoring Location EFF-001) and Discharge Point 002 (Monitoring Location LND-00A) was used for the RPA.

c. **Assimilative Capacity/Mixing Zone**

i. **Regulatory Guidance for Dilution Credits and Mixing Zones.** The CWA directs states to adopt water quality standards to protect the quality of their waters. U.S. EPA's current water quality standards regulation authorizes states to adopt general policies, such as mixing zones, to implement state water quality standards (40 C.F.R. sections 122.44 and 122.45). U.S. EPA allows states to have broad flexibility in designing mixing zone policies. Primary policy and guidance on determining mixing zones and dilution credits is provided by the SIP and the Basin Plan. If no procedure applies in the SIP or the Basin Plan, then the Central Valley Water Board may use the U.S. EPA *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (TSD).

For non-priority pollutant constituents, the allowance of mixing zones by the Central Valley Water Board is discussed in the Basin Plan, *Policy for Application of Water Quality Objectives*, which states in part, "*In conjunction with the issuance of NPDES and storm water permits, the Regional Board may designate mixing zones within which water quality objectives will not apply provided the discharger has demonstrated to the satisfaction of the Regional Board that the mixing zone will not adversely impact beneficial uses. If allowed, different mixing zones may be designated for different types of objectives, including, but not limited to, acute aquatic life objectives, chronic aquatic life objectives, human health objectives, and acute and chronic whole effluent toxicity objectives, depending in part on the averaging period over which the objectives apply. In determining the size of such mixing zones, the Regional Board will consider the applicable procedures and guidelines in the EPA's Water Quality Standards Handbook and the* [TSD]. *Pursuant to EPA guidelines, mixing zones designated for acute aquatic life objectives will generally be limited to a small zone of initial dilution in the immediate vicinity of the discharge.*"

For priority pollutants, the SIP supersedes the Basin Plan mixing zone provisions. Section 1.4.2 of the SIP states, in part, "*...with the exception of effluent limitations derived from TMDL's, in establishing and determining compliance with effluent limitations for applicable human health, acute aquatic life, or chronic aquatic life priority pollutant criteria/objectives or the toxicity objective for aquatic life protection in a basin plan, the Regional Board may grant mixing zones and dilution credits to dischargers...The applicable priority pollutant criteria and objectives are to be met through a water body except within any mixing zone granted by the Regional Board.* ***The allowance of mixing zones is discretionary and shall be determined on a discharge-by-discharge basis.*** *The Regional Board may consider allowing mixing zones and dilution credits only for discharges with a physically identifiable point of discharge that is regulated through an NPDES permit issued by the Regional Board.*" [emphasis added]

For incompletely-mixed discharges, the Discharger must complete an independent mixing zone study to demonstrate to the Central Valley Water Board that a dilution credit is appropriate. In granting a mixing zone, section 1.4.2.2 of the SIP requires the following to be met:

"***A mixing zone shall be as small as practicable***. *The following conditions must be met in allowing a mixing zone*: [emphasis added]

A: A mixing zone shall not:

1. compromise the integrity of the entire water body;

2. cause acutely toxic conditions to aquatic life passing through the mixing zone;

3. restrict the passage of aquatic life;

4. adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws;

5. produce undesirable or nuisance aquatic life;

6. result in floating debris, oil, or scum;

7. produce objectionable color, odor, taste, or turbidity;

8. cause objectionable bottom deposits;

9. cause nuisance;

10. dominate the receiving water body or overlap a mixing zone from different outfalls; or

11. be allowed at or near any drinking water intake. A mixing zone is not a source of drinking water. To the extent of any conflict between this determination and the Sources of Drinking Water Policy (Resolution 88-63), this SIP supersedes the provisions of that policy."

Section 1.4.2.1 of the SIP establishes the authority for the Central Valley Water Board to consider dilution credits based on the mixing zone conditions in a receiving water. Section 1.4.2.1 in part states:

"*The dilution credit, D, is a numerical value associated with the mixing zone that accounts for the receiving water entrained into the discharge. The dilution credit is a value used in the calculation of effluent limitations (described in section 1.4).* ***Dilution credits may be limited or denied on a pollutant-by-pollutant basis, which may result in a dilution credit for all, some, or no priority pollutants in the discharge.***" [emphasis added]

The mixing zone is thus an administrative construct defined as an area around the outfall that may exceed water quality objectives, but is otherwise protective of the beneficial uses. Dilution is defined as the amount of mixing that has occurred at the edge of this mixing zone under critical conditions, thus protecting the beneficial uses at the concentration and for the duration and frequency required.

ii. **Sacramento River Hydrology.** The upper Sacramento River in the vicinity of the discharge has sufficient flows for dilution (greater than 20:1). The discharge location is 10 miles downstream of Box Canyon Dam and approximately 30 miles upstream of Shasta Lake. Shasta Dam, Box Canyon Dam, and the reservoirs created by them are the most prominent water supply/flood control features present in the watershed. The Sacramento River watershed upstream from Shasta Lake has an area of about 6,420 square miles. Approximately 50 percent of the watershed is located above 3,000 feet and, as a result,

snowfall and snowpack are major influences on the hydrologic cycle of the area. Lake Siskiyou (created by Box Canyon Dam in 1968 for purposes of hydroelectric power production) is a 430-acre reservoir with source water derived primarily from snowmelt. Recreation is a primary use of Lake Siskiyou and lake levels are maintained at or near full year-round. However, Siskiyou County Flood Control and Water Conservation District (owner and operator of Box Canyon Dam) is mandated to maintain a minimum outflow discharge rate of 40 cubic feet per second (cfs) from Box Canyon Dam. There are stream tributaries adding flow between Box Canyon Dam and the Facility outfall and no in-stream continuous recording flow measurement devices exist between Box Canyon Dam and Discharge Point 001.

With the ROWD, the Discharger submitted an update to their September 2009 Mixing Zone Study (2009 Mixing Zone Study), which determined updated critical receiving water flow values at Discharge Point 001 based on the ratio of historical flow values at U.S. Geological Survey (USGS) station 11342000 (Delta Station), located a few miles upstream of Shasta Lake, and the flow measured at Discharge Point 001 on the day of the Discharger's 2009 Mixing Zone Study. The estimated lowest 1-day flow with an average reoccurrence frequency of once in 10 years (1Q10), lowest average 7 consecutive day flow with an average reoccurrence frequency of once in 10 years (7Q10), and harmonic mean flow of the receiving water at Discharge Point 001 are provided in Table F-5, below.

Table F-5. Critical Receiving Water Flows

Critical Low Flows (cfs)	Box Canyon Dam (cfs) (10 miles upstream)	Dunsmuir (cfs) (Facility Outfall)	Delta Flows (cfs) (30 miles downstream)
1Q10	41	79.9	154
7Q10	41	81.5	157
Harmonic Mean	256	216.6	417

The Facility does not discharge to the Sacramento River during the summer, which Order R5-2012-0085 refers to as the "recreation season" and defines as the period from 15 June through 15 September. Therefore, effluent is only discharged to the Sacramento River between 16 September and 14 June.

iii. **Dilution Ratios.** Before establishing a mixing zone and a dilution credit for a discharge, it must first be determined if and how much (if any), receiving water is available to dilute the discharge. In determining the appropriate available receiving water flow, the Central Valley Water Board may take into account actual and seasonal variations of the receiving water and the effluent. For example, the Central Valley Water Board may prohibit mixing zones during seasonal low flows and allow them during seasonal high flows. However, for year-round mixing zones, the mixing zone and associated dilution credits shall be determined using the parameters specified in Table F-6, below.

Table F-6. Effluent and Receiving Water Flows for Calculating Dilution Ratios

In calculating dilution ratio for:	Use the critical receiving water flow of:	Use the discharged effluent flow of:
Acute aquatic life criteria/objective	1Q10	Maximum daily flow during period of discharge
Chronic aquatic life criteria/objective	7Q10	Four-day average of daily maximum flows during period of discharge

In calculating dilution ratio for:	Use the critical receiving water flow of:	Use the discharged effluent flow of:
Human health criteria/objective	Harmonic Mean	Long-term average during period of discharge

For completely-mixed discharges, the amount of receiving water available to dilute the effluent may be determined by calculating the dilution ratio using the flows in Table F-6, above. The Central Valley Water Board cannot grant a dilution credit that is greater than the calculated dilution ratio. Site-specific conditions concerning the discharge and the receiving water may also justify a smaller dilution credit for completely-mixed discharges. For incompletely-mixed discharges, dilution credits and mixing zones may be considered by the Central Valley Water Board only after the Discharger has completed an independent mixing zone study and demonstrated to the satisfaction of the Central Valley Water Board that a dilution credit is appropriate. Dilution credits for incompletely-mixed discharges, inherently, cannot be greater than the calculated dilution ratios from the flow values in Table F-6.

Table F-7, below, provides the calculated dilution ratios for the applicable acute, chronic, and human health criteria/objectives based on the updated critical flow values provided in the ROWD.

Table F-7. Calculated Dilution Ratios

Criteria	Receiving Water (cfs)	Effluent (MGD)	Dilution Ratio
Acute	79.9	2.38	34:1
Chronic	81.5	1.66	49:1
Human Health	216.6	0.327	662:1

The Central Valley Water Board cannot grant a dilution credit that is greater than the calculated dilution ratio. Therefore, based on the data summarized in Table F-7, dilution credits for acute aquatic life, chronic aquatic life, and human heath criteria cannot be larger than 34:1, 49:1, and 662:1, respectively. These dilution ratios represent allocating the entire assimilative capacity of the localized river segment.

iv. **Mixing Zone Study Results.** The Discharger's 2009 Mixing Zone Study included a tracer-dye study with in-stream monitoring to characterize the extent of the actual dilution. The 2009 Mixing Zone Study was conducted while the receiving water flow was approximately 98 cfs and the effluent flow was approximately 0.2 MGD. Field-obtained dilution credits were adjusted linearly to account for the critical flow regimes as outlined in Table F-7, above.

The 2009 Mixing Zone Study found that the discharge is not a completely-mixed discharge. The furthest downstream transect where measurements were taken was 400 feet. At 400 feet downstream of the discharge, the 2009 Mixing Zone Study found that the discharge was not completely-mixed. Calculated dilution credits, as presented in the 2009 Mixing Zone Study Addendum No. 1 at the 20-, 50-, and 100-foot transects and adjusted based on the updated critical flow values calculated in the ROWD, are provided in Table F-8, below. Each transect provides the corresponding dilution credits for each specific criterion (acute aquatic life, chronic aquatic life, and human health). A comparison to maximum allowable dilution (as provided in Table F-7) in the river segment is also provided.

Table F-8. Mixing Zone Study Results

Acute			
Length (ft.)	**Width (ft.)**	**Dilution Credit**	**Maximum "Available" Dilution Ratio**
20	8	6	34:1
50	17	9	
100	19	12	
Chronic			
Length (ft.)	**Width (ft.)**	**Dilution Credit**	**Maximum "Available" Dilution Ratio**
20	8	10	49:1
50	17	14	
100	19	19	
Human Health			
Length (ft.)	**Width (ft.)**	**Dilution Credit**	**Maximum "Available" Dilution Ratio**
20	8	134	662:1
50	17	189	
100	19	252	

The Discharger also performed a biological assessment of the mixing zone and submitted the findings (*Biological Assessment of the City of Dunsmuir Wastewater Treatment Plant Mixing Zone*, November 2009) to the California Department of Fish and Wildlife (DFW; formerly the Department of Fish and Game) for review and comment. DFW found the biological assessment to be adequate for trustee purposes.

As described in section II.A of this Fact Sheet, in early 2017, several cold storms provided snow in low elevations followed by warm, heavy rain events, which created flooding conditions in the vicinity of the Facility's diffuser, deposited a large amount of gravel on the east side of the river bed, and created a new channel on the west side of the river. The Discharger completed a project to restore a portion of the flow to the east side of the river by establishing a diversion channel through the recently deposited gravel bar upstream of the diffuser. Gravel deposited immediately downstream of the diffuser was also dredged to provide sufficient dilution of the Facility's effluent. The diversion channel upstream of the discharge, in combination with the replacement of sediment immediately downstream of the diffuser, are expected to ensure the available dilution of the effluent, as determined in the 2009 Mixing Zone Study and updated as part of the Discharger's ROWD.

v. **Evaluation of Available Dilution for Acute and Chronic Aquatic Life Criteria.** U.S. EPA Region VIII, in its "*EPA Region VIII Mixing Zones and Dilution Policy*", recommends no dilution for acute aquatic life criteria, stating the following, "*In incomplete mix situations, discharge limitations to implement acute chemical-specific aquatic life criteria and narrative (no acute toxicity) criteria shall be based on achieving such acute criteria at the end-of-pipe (i.e., without an allowance for dilution). This approach is intended to implement the narrative requirement prohibiting acutely toxic conditions in the mixing zone.*"

The Discharger has requested acute and chronic aquatic life mixing zones for compliance with acute and chronic water quality criteria for ammonia, copper,

and zinc. Acute and chronic aquatic life mixing zones 17 feet wide and extending 50 feet downstream of the Facility's outfall meet the requirements of the SIP as follows:

(a) *Shall not compromise the integrity of the entire water body* – The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a water body (such as a river segment), then mixing zones are likely to have little effect on the integrity of the water body as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"[1] The width of the Sacramento River at the outfall is approximately 45 feet at the surface. The acute and chronic aquatic life mixing zones are 17 feet wide by 50 feet in length. The mixing zones are small and make up less than half of the stream width. The aquatic life mixing zones do not compromise the integrity of the entire water body.

(b) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The SIP requires that the acute mixing zone be appropriately sized to prevent lethality to organisms passing through the mixing zone. U.S. EPA recommends that float times through a mixing zone less than 15 minutes ensure that there will not be lethality to passing organisms. The acute mixing zone extends 50 feet downstream of the outfall. Based on a minimum river velocity of 1.0 feet/second, the minimum float time is 0.8 minutes.[2] Furthermore, this Order includes an acute toxicity effluent limitation that requires compliance to be determined based on acute bioassays using 100 percent effluent. Compliance with these requirements ensures that acute toxic conditions to aquatic life passing through the acute and chronic mixing zones do not occur.

(c) *Shall not restrict the passage of aquatic life* – The Discharger conducted a dye test as part of the 2009 Mixing Zone Study, which demonstrated there is a zone of passage for aquatic life. The size of the zone of passage varies on either side of the river depending on the river geometry. The width of the river ranges from approximately 45 to 60 feet. Based on the maximum dye concentration contours, the zone of passage at the surface of the river is approximately 15 feet on the west side of the river and 5 feet on the east side of the river.

(d) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws* – The acute and chronic mixing zones will not cause acutely toxic conditions, allow adequate zones of passage, and are sized appropriately to ensure that there will be no adverse impacts to biologically sensitive or critical habitats.

(e) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The current discharge has not been shown to result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

[1] TSD, pg. 33
[2] Mixing Zone and Dilution Study, PACE Engineering dated October 2009.

(f) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The acute and chronic mixing zones are small relative to the water body, so they will not dominate the water body. Furthermore, the mixing zones do not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge (the Mt. Shasta Wastewater Treatment Plant (WWTP) outfall is located approximately 9 miles upstream).

(g) *Shall not be allowed at or near any drinking water intake* – The acute and chronic mixing zones are not near a drinking water intake. There are no known downstream drinking water intakes between the discharge and Shasta Lake, which is 30 miles downstream.

The acute and chronic aquatic life mixing zones, therefore, comply with the SIP. The mixing zones also comply with the Basin Plan, which requires that the mixing zones not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zones, the Central Valley Water Board considered the procedures and guidelines in U.S. EPA's *Water Quality Standards Handbook, 2nd Edition* (updated July 2007), section 5.1, and section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

vi. **Evaluation of Available Dilution for Human Health Criteria.** Section 1.4.2.2 of the SIP provides that mixing zones should not be allowed at or near drinking water intakes. Furthermore, regarding the application of a mixing zone for the protection of human health, the TSD states that, "*…the presence of mixing zones should not result in significant health risks, when evaluated using reasonable assumptions about exposure pathways. Thus, where drinking water contaminants are a concern, mixing zones should not encroach on drinking water intakes.*" There are no drinking water intakes in the human health mixing zone. A mixing zone for human health carcinogens has been allowed in this Order for the development of WQBEL's for dichlorobromomethane. The human health mixing zone, which is 8 feet wide and extends 20 feet downstream of the Facility's outfall, meets the requirements of the SIP as follows:

(a) *Shall not compromise the integrity of the entire water body* – The TSD states that, "*If the total area affected by elevated concentrations within all mixing zones combined is small compared to the total area of a water body (such as a river segment), then mixing zones are likely to have little effect on the integrity of the water body as a whole, provided that the mixing zone does not impinge on unique or critical habitats.*"[1] The human health mixing zone is not applicable to aquatic life criteria. The human health mixing zone does not compromise the integrity of the entire waterbody.

(b) *Shall not cause acutely toxic conditions to aquatic life passing through the mixing zone* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, acutely toxic conditions will not occur in the mixing zone.

[1] TSD, pg. 33

(c) *Shall not restrict the passage of aquatic life* – The human health mixing zone is not applicable to aquatic life criteria. Therefore, the mixing zone will not restrict the passage of aquatic life.

(d) *Shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or state endangered species laws* – The human health mixing zone is not applicable to aquatic life criteria. The mixing zone will not impact biologically sensitive or critical habitats.

(e) *Shall not produce undesirable or nuisance aquatic life; result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; cause nuisance* – The allowance of a human health mixing zone will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum; produce objectionable color, odor, taste, or turbidity; cause objectionable bottom deposits; or cause nuisance.

(f) *Shall not dominate the receiving water body or overlap a mixing zone from different outfalls* – The human health mixing zone is small relative to the water body, so it will not dominate the water body. Furthermore, the mixing zone does not overlap mixing zones from other outfalls. There are no outfalls or mixing zones in the vicinity of the discharge (the Mt. Shasta WWTP outfall is located approximately 9 miles upstream).

(g) *Shall not be allowed at or near any drinking water intake* – The human health mixing zone is not near a drinking water intake. There are no known downstream drinking water intakes between the discharge and Shasta Lake, which is 30 miles downstream.

The human health mixing zone, therefore, complies with the SIP. The mixing zone also complies with the Basin Plan, which requires that the mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zone, the Central Valley Water Board considered the procedures and guidelines in U.S. EPA's *Water Quality Standards Handbook, 2nd Edition* (updated July 2007), section 5.1, and section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

vii. **Evaluation of Available Dilution for Specific Constituents (Pollutant-by-Pollutant Evaluation).** As discussed in section IV.C.3 of this Fact Sheet, based on existing effluent data, it appears the Facility cannot meet the end-of-pipe (no dilution) WQBEL's for ammonia, copper, dichlorobromomethane, and zinc.

The allowance of a mixing zone and dilution credits is a discretionary act by the Central Valley Water Board. When determining the appropriate dilution credits for a specific pollutant, several factors must be considered, such as available assimilative capacity, Facility performance, and best practicable treatment or control (BPTC). The Central Valley Water Board has determined the allowable dilution credits on a constituent-by-constituent basis.

The receiving water contains assimilative capacity for ammonia, copper, dichlorobromomethane, and zinc. As discussed above, acute, chronic, and human health mixing zones with associated dilution credits of 9, 14, and 189, respectively, meet the mixing zone conditions specified in section 1.4.2.2.A of

the SIP. However, an overarching mixing zone condition is that "*A mixing zone shall be as small as practicable,*" and section 1.4.2.2.B requires, "*The RWQCB shall deny or significantly limit a mixing zone and dilution credits as necessary to protect beneficial uses, meet the conditions of this Policy, or comply with other regulatory requirements.*"

The Central Valley Water Board considered Facility performance and the receiving water's assimilative capacity for each individual pollutant in determining the dilution needed. The consideration of these factors is necessary to avoid allocating an unnecessarily large portion of the receiving water's assimilative capacity for each pollutant and possibly violating the Antidegradation Policy. Based on Facility performance, the full dilution credits, as discussed above, are not needed for dichlorobromomethane and zinc and have been reduced to ensure compliance with the mixing zone provisions of the SIP. Based on Facility performance for ammonia and copper, this Order utilizes the maximum acute aquatic life dilution credit of 9 and the maximum chronic aquatic life dilution credit of 14.

Table F-9. Dilution Credits Associated with Performance-Based Effluent Limitations

Pollutant	Units	ECA	Criterion	Background	Dilution Credit[1]
Ammonia Nitrogen, Total (as N)	mg/L	56 (Acute) 48 (Chronic)	5.62 (Acute)[2] 3.18 (Chronic)[3]	<0.010	9 (Acute) 14 (Chronic)
Copper, Total Recoverable	µg/L	54 (Basin Plan) 54 (Chronic)	6.4 (Basin Plan) 4.6 (Chronic)	1.1	9 (Basin Plan) 14 (Chronic)
Dichlorobromomethane	µg/L	25	0.56	<0.080	49.9 (HH)
Zinc, Total Recoverable	µg/L	140 (Basin Plan) 94 (Chronic)	18 (Basin Plan) 60 (Chronic)	1.2	7.4 (Basin Plan) 0.56 (Chronic)

1 The dilution credit is calculated using the steady-state mass balance equation rearranged to solve for the dilution credit, as follows:
D = (ECA – C) / (C – B)

2 U.S. EPA National Recommended Ambient Water Quality Criteria, Freshwater Aquatic Life Protection, 1-hour average.

3 U.S. EPA National Recommended Ambient Water Quality Criteria, Freshwater Aquatic Life Protection, 30-day average.

The revised mixing zones and dilution credits for ammonia, copper, and zinc will result in a minor increase in the discharge (i.e., use of less than 10 percent of the available assimilative capacity for these constituents in the receiving water). According to U.S. EPA's memorandum on Tier 2 Antidegradation Reviews and Significance Thresholds, any individual decision to lower water quality for non-bioaccumulative chemicals that is limited to 10 percent of the available assimilative capacity represents minimal risk to the receiving water and is fully consistent with the objectives and goals of the Clean Water Act.

The revised mixing zone and dilution credit for dichlorobromomethane will result in an increase in the discharge that results in the use of greater than 10 percent of the available assimilative capacity for this constituent. As described in section IV.D.4 of this Fact Sheet, the Discharger submitted an antidegradation analysis with the ROWD that justifies the relaxation of performance-based effluent limits for dichlorobromomethane. The Central Valley Water Board has determined the Discharger's antidegradation analysis is consistent with the state and federal antidegradation requirements.

viii. **Regulatory Compliance for Dilution Credits and Mixing Zones.** To fully comply with all applicable laws, regulations and policies of the state, the Central Valley Water Board-approved mixing zones and the associated dilution credits are based on the following:

(a) Mixing zones are allowed under the SIP provided all elements contained in section 1.4.2.2 are met. The Central Valley Water Board has determined that these factors are met.

(b) Section 1.4.2.2 of the SIP requires mixing zones to be as small as practicable. The Central Valley Water Board has determined the mixing zones are as small as practicable.

(c) In accordance with section 1.4.2.2 of the SIP, the Central Valley Water Board has determined the mixing zones are as small as practicable and will not compromise the integrity of the entire water body, restrict the passage of aquatic life, dominate the water body, or overlap existing mixing zones from different outfalls. The mixing zones are small relative to the large size of the receiving water, are not at or near a drinking water intake, and do not overlap a mixing zone from a different outfall.

(d) The Central Valley Water Board is allowing mixing zones for acute aquatic life, chronic aquatic life, and human health constituents, and has determined allowing such mixing zones will not cause acutely toxic conditions to aquatic life passing through the mixing zone.

(e) The Central Valley Water Board has determined the discharge will not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under the federal or state endangered species laws, because the mixing zones are relatively small and acutely toxic conditions will not occur in the mixing zones. The discharge will not produce undesirable or nuisance aquatic life, result in floating debris, oil, or scum, produce objectionable odor, taste, or turbidity, cause objectionable bottom deposits, or cause nuisance, because the Order establishes end-of-pipe effluent limitations (e.g., for BOD_5 and TSS) and discharge prohibitions to prevent these conditions from occurring.

(f) As required by the SIP, in determining the extent of or whether to allow mixing zones and dilution credits, the Central Valley Water Board has considered the presence of pollutants in the discharge that are carcinogenic, mutagenic, teratogenic, persistent, bioaccumulative, or attractive to aquatic organisms, and concluded that the allowance of the mixing zones and dilution credits are adequately protective of the beneficial uses of the receiving water.

(g) The Central Valley Water Board has determined the mixing zones comply with the SIP for priority pollutants.

(h) Section 1.4.2.2.B of the SIP, in part states, *"The RWQCB shall deny or significantly limit a mixing zone and dilution credits as necessary to protect beneficial uses, meet the conditions of this Policy, or comply with other regulatory requirements."* The Central Valley Water Board has determined full allowance of dilution is not needed or necessary for the Discharger to achieve compliance with this Order, except for effluent limitations for ammonia and copper, as described above.

(i) The Central Valley Water Board has determined the mixing zones comply with the Basin Plan for non-priority pollutants. The Basin Plan requires a mixing zone not adversely impact beneficial uses. Beneficial uses will not be adversely affected for the same reasons discussed above. In determining the size of the mixing zones, the Central Valley Water Board has considered the procedures and guidelines in section 5.1 of U.S. EPA's *Water Quality Standards Handbook*, 2nd Edition (updated July 2007) and section 2.2.2 of the TSD. The SIP incorporates the same guidelines.

(j) The Central Valley Water Board has determined that allowing dilution factors that exceed those proposed by this Order would not comply with the State Antidegradation Policy for receiving waters outside the allowable mixing zones for ammonia, copper, dichlorobromomethane, and zinc. The State Antidegradation Policy incorporates the federal Antidegradation Policy and requires that existing quality of waters be maintained unless degradation is justified based on specific findings. Item 2 of the State Antidegradation Policy states:

"*Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.*"

The Central Valley Water Board has determined the effluent limitations required by this Order will result in the Discharger implementing BPTC of the discharge necessary to assure that pollution or nuisance will not occur and the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

Therefore, the Central Valley Water Board has determined the effluent limitations established in the Order for ammonia, copper, dichlorobromomethane, and zinc, which have been adjusted for dilution credits, are appropriate and necessary to comply with the Basin Plan, SIP, federal antidegradation regulations, and the State Antidegradation Policy.

d. **Conversion Factors.** The CTR contains aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, copper, lead, nickel, silver, and zinc, which are presented in dissolved concentrations. U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. The default U.S. EPA conversion factors contained in Appendix 3 of the SIP were used to convert the applicable dissolved criteria to total recoverable criteria.

e. **Hardness-Dependent CTR Metals Criteria.** The CTR and the NTR contain water quality criteria for seven metals that vary as a function of hardness. The lower the hardness, the lower the water quality criteria. The metals with hardness-dependent criteria include cadmium, copper, chromium III, lead, nickel, silver, and zinc.

This Order has established the criteria for hardness-dependent metals based on the hardness of the receiving water (actual ambient hardness) as required by the SIP[1] and the CTR.[2] The SIP and the CTR require the use of "receiving water" or "actual ambient" hardness, respectively, to determine effluent limitations for these metals. The CTR requires that the hardness values used shall be consistent with the design discharge conditions for design flows and mixing zones.[3] Design flows for aquatic life criteria include the 1Q10 and the 7Q10.[4] This section of the CTR also indicates that the design conditions should be established such that the appropriate criteria are not exceeded more than once in a 3-year period, on average.[5] The CTR requires that when mixing zones are allowed, the CTR criteria apply at the edge of the mixing zone, otherwise the criteria apply throughout the water body including at the point of discharge.[6] The CTR does not define the term "ambient," as applied in the regulations. Therefore, the Central Valley Water Board has considerable discretion to consider upstream and downstream ambient conditions when establishing the appropriate water quality criteria that fully comply with the CTR and SIP.

i. **Summary Findings**

The ambient hardness for the Sacramento River is represented by the data in Figure F-1, below, which shows ambient hardness ranging from 9 mg/L to 60 mg/L based on collected ambient data from September 2014 through June 2017. Given the high variability in ambient hardness values, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum). Because of this variability, staff has determined that based on representative ambient hardness concentrations measured in the receiving water, the Central Valley Water Board has discretion to select ambient hardness values within the range of 9 mg/L (minimum) up to 60 mg/L (maximum). Staff recommends that the Board use the ambient hardness values shown in Table F-10 for the following reasons.

(a) Using the ambient receiving water hardness values shown in Table F-10 will result in criteria and effluent limitations that ensure protection of beneficial uses under all ambient receiving water conditions.

(b) The Water Code mandates that the Central Valley Water Board establish permit terms that will ensure the reasonable protection of beneficial uses. In this case, using the lowest measured ambient hardness to calculate effluent limitations is not required to protect beneficial uses. Calculating effluent limitations based on the lowest measured ambient hardness is not required by the CTR or SIP, and is not reasonable as it would result in overly conservative limits that will impart substantial costs to the Discharger and ratepayers without providing any additional protection of beneficial uses. In compliance with applicable state and federal regulatory requirements, after considering the representative range of ambient

[1] The SIP does not address how to determine the hardness for application to the equations for the protection of aquatic life when using hardness-dependent metals criteria. It simply states, in section 1.2, that the criteria shall be properly adjusted for hardness using the hardness of the receiving water.
[2] The CTR requires that, for waters with a hardness of 400 mg/L (as $CaCO_3$), or less, the actual ambient hardness of the surface water must be used (40 C.F.R. § 131.38(c)(4)).
[3] 40 C.F.R. §131.3(c)(4)(ii)
[4] 40 C.F.R. §131.38(c)(2)(iii) Table 4
[5] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2
[6] 40 C.F.R. §131.38(c)(2)(i)

hardness values, Central Valley Water Board staff has used the ambient hardness values shown in Table F-10 to calculate the proposed effluent limitations for hardness-dependent metals. The proposed effluent limitations are protective of beneficial uses under all flow conditions.

(c) Using an ambient hardness that is higher than the minimum of 9 mg/L will result in limits that may allow increased metals to be discharged to the Sacramento River, but such discharge is allowed under the State Antidegradation Policy (State Water Board Resolution 68-16). The Central Valley Water Board finds that this degradation is consistent with the Antidegradation Policy (see antidegradation findings in section IV.D.4 of the Fact Sheet). The Antidegradation Policy requires the Discharger to meet WDR's that will result in the BPTC of the discharge necessary to assure that: a) a pollution or nuisance will not occur, and b) the highest water quality consistent with maximum benefit to the people of the state will be maintained.

(d) Using the ambient hardness values shown in Table F-10 is consistent with the CTR and SIP's requirements for developing metals criteria.

Table F-10. Summary of CTR Criteria and Site-Specific Basin Plan Objectives for Hardness-Dependent Metals

CTR Metals	Ambient Hardness (mg/L)[2,3]	CTR Criteria (µg/L, total recoverable)[1]		Basin Plan Objective (µg/L, total recoverable)[1]
		Acute	Chronic	Maximum Concentration
Copper	44	6.5	4.6	6.4
Chromium III	44	890	110	--
Cadmium	44 (Acute) 44 (Chronic)	1.3	1.8	0.26
Lead	44	29	1.1	--
Nickel	44	230	26	--
Silver	44	0.99	--	--
Zinc	44	60	60	18

[1] Metal criteria rounded to two significant figures in accordance with the CTR (40 C.F.R. section 131.38(b)(2)).
[2] The ambient hardness values in this table represent actual observed receiving water hardness measurements from the dataset shown in Figure F-1.
[3] The Basin Plan and CTR hardness-dependent metals criteria equations vary depending on the metal, which results in differences in the range of ambient hardness values that may be used to develop effluent limitations that are protective of beneficial uses and comply with the Basin Plan objective and CTR criteria for all ambient flow conditions.

ii. **Background**

The State Water Board provided direction regarding the selection of hardness in two precedential water quality orders; WQO 2008-0008 for the City of Davis Wastewater Treatment Plant (Davis Order) and WQO 2004-0013 for the Yuba City Wastewater Treatment Plant (Yuba City Order). The State Water Board recognized that the SIP and the CTR do not discuss the manner in which hardness is to be ascertained, thus regional water boards have considerable discretion in determining ambient hardness so long as the selected value is protective of water quality criteria under the given flow conditions (Davis Order, p.10). The State Water Board explained that it is necessary that, "*The*

[hardness] value selected should provide protection for all times of discharge under varying hardness conditions." (Yuba City Order, p. 8). The Davis Order also provides that, "*Regardless of the hardness used, the resulting limits must always be protective of water quality criteria under all flow conditions.*" (Davis Order, p. 11)

The equation describing the total recoverable regulatory criterion, as established in the CTR, is as follows:

CTR Criterion = WER x ($e^{m[\ln(H)]+b}$) (Equation 1)

Where:

H = ambient hardness (as $CaCO_3$) [1]

WER = water-effect ratio

m, b = metal- and criterion-specific constants

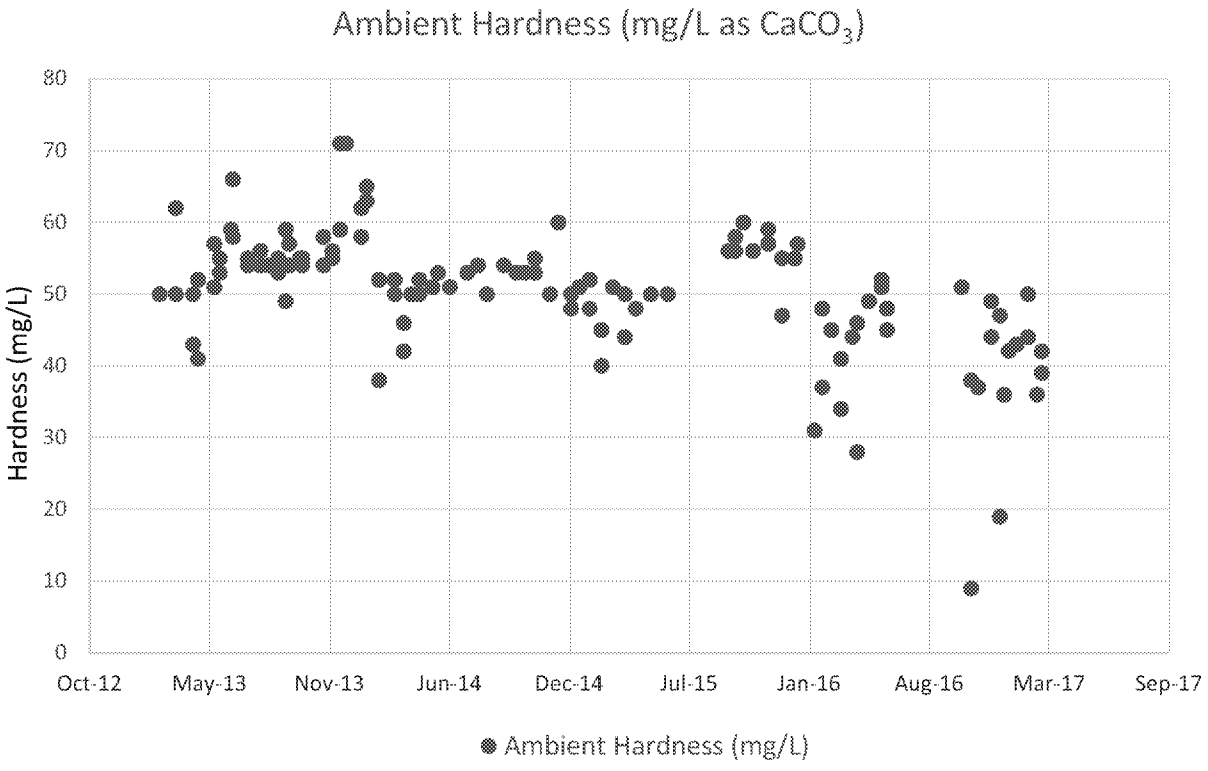
The direction in the CTR regarding hardness selection is that it must be based on ambient hardness and consistent with design discharge conditions for design flows and mixing zones. Consistent with design discharge conditions and design flows means that the selected "design" hardness must result in effluent limitations under design discharge conditions that do not result in more than one exceedance of the applicable criteria in a 3-year period.[2] Where design flows for aquatic life criteria include the 1Q10 and the 7Q10. The 1Q10 and 7Q10 Sacramento River flows are 79.9 cfs and 81.5 cfs, respectively.

iii. **Ambient Conditions**

The ambient receiving water hardness varied from 9 mg/L to 60 mg/L, based on 67 samples collected during the discharge season from September 2014 through June 2017 (see Figure F-1).

[1] For this discussion, all hardness values are expressed in mg/L as $CaCO_3$.
[2] 40 C.F.R. §131.38(c)(2)(iii) Table 4, notes 1 and 2

Figure F-1. Observed Ambient Hardness Concentrations 9 mg/L – 60 mg/L



In this analysis, the entire range of ambient hardness concentrations shown in Figure F-1 were considered to determine the appropriate ambient hardness to calculate the CTR criteria and effluent limitations that are protective under representative discharge conditions.

iv. **Approach to Derivation of Criteria**

As shown above, ambient hardness varies substantially. Because of the variation, there is no single hardness value that describes the ambient receiving water for all possible scenarios (e.g., minimum, maximum, mid-point). While the hardness selected must be hardness of the ambient receiving water, selection of an ambient receiving water hardness that is too high would result in effluent limitations that do not protect beneficial uses. Also, the use of minimum ambient hardness would result in criteria that are protective of beneficial uses, but such criteria may not be representative considering the wide range of ambient conditions.

Reasonable worst-case ambient conditions. To determine whether a selected ambient hardness value results in effluent limitations that are fully protective while complying with federal regulations and state policy, staff have conducted an analysis considering varying ambient hardness and flow conditions. To do this, the Central Valley Water Board has ensured that the receiving water hardness and criteria selected for effluent limitations are protective under "reasonable-worst case ambient conditions." These conditions represent the receiving water conditions under which derived effluent limitations would ensure protection of beneficial uses under all ambient flow and hardness conditions.

Reasonable worst-case ambient conditions:

(a) "Low receiving water flow." CTR design discharge conditions (1Q10 and 7Q10) have been selected to represent reasonable worst case receiving water flow conditions.

(b) "High receiving water flow (maximum receiving water flow)." This additional flow condition has been selected consistent with the Davis Order, which required that the hardness selected be protective of water quality criteria under all flow conditions.

(c) "Low receiving water hardness." The CTR requires that the hardness values used shall be consistent with the design discharge conditions for design flows and mixing zones, where design flows are equal to the 1Q10 and 7Q10. Since ambient hardness data collected by the Discharger is limited at the 1Q10 and 7Q10 of 79.9 cfs and 81.5 cfs, respectively, hardness data was evaluated when Sacramento River flows at Dunsmuir were less than 350 cfs, determined based on flow measurements at the Delta Station and adjusted based on the mixing zone update calculations submitted with the ROWD. The Central Valley Water Board has determined that Sacramento River flows below the 350 cfs threshold are representative of low-flow conditions. Ambient hardness data ranged from 44 mg/L to 60 mg/L when Sacramento River flows at Dunsmuir were less than 350 cfs. Thus, a receiving water hardness condition of 44 mg/L was selected to represent the reasonable worst case receiving water hardness.

(d) "Background ambient metal concentration at criteria." This condition assumes that the metal concentration in the background receiving water is equal to CTR criteria (upstream of the Facility's discharge). Based on data in the record, this is a design condition that does not regularly occur in the receiving water and is used in this analysis to ensure that limits are protective of beneficial uses even in the situation where there is no assimilative capacity.

v. **Approach to Derivation of Criteria Where No Dilution Allowed**

As shown in Table F-10 above, an ambient hardness value of 44 mg/L, which represents the minimum ambient hardness value observed during the discharge season when Sacramento River flows were below 350 cfs, was selected to calculate CTR hardness-dependent metals criteria. Using this hardness value, which is an actual sample result collected in the receiving water, will result in effluent limitations that are protective under all ambient flow conditions. Nickel and silver are used as examples below to illustrate the results of the analysis. Tables F-11 and F-12, below, summarize the numeric results of the three-step iterative approach for nickel and silver. As shown in the example tables, an ambient hardness value of 44 mg/L is used in the CTR equations to derive criteria and effluent limitations for nickel and silver. Then, under the "check" step, worst-case ambient receiving water conditions are used to test whether discharge results in compliance with CTR criteria and protection of beneficial uses.

The results of the above analysis, summarized in the tables below, show that the design ambient hardness value of 44 mg/L results in protective effluent limitations that achieve CTR criteria under all flow conditions. Tables F-11 and

F-12, below, summarize the critical flow conditions. However, the analysis evaluated all flow conditions to ensure compliance with the CTR criteria at all times.

Table F-11. Verification of CTR Compliance for Nickel

Receiving water hardness used to compute effluent limitations				44 mg/L
Effluent Concentration Allowance (ECA) for Nickel[1]				26 µg/L
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			Complies with CTR Criteria?
	Hardness	CTR Criteria (µg/L)	Ambient Nickel Concentration[2] (µg/L)	
1Q10	44	26	26	Yes
7Q10	44	26	26	Yes
Max receiving water flow	44	26	26	Yes

1 The ECA defines effluent quality necessary to meet the CTR criteria in the receiving water. There are no effluent limitations for nickel as it demonstrates no reasonable potential.

2 This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

Table F-12. Verification of CTR Compliance for Silver

Receiving water hardness used to compute effluent limitations				44 mg/L
Effluent Concentration Allowance (ECA) for Silver[1]				0.99 µg/L
	Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions			Complies with CTR Criteria?
	Hardness	CTR Criteria (µg/L)	Ambient Silver Concentration[2] (µg/L)	
1Q10	44	1.0	1.0	Yes
7Q10	44	1.0	1.0	Yes
Max receiving water flow	44	1.0	1.0	Yes

1 The ECA defines effluent quality necessary to meet the CTR criteria in the receiving water. There are no effluent limitations for silver as it demonstrates no reasonable potential.

2 This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

vi. Approach to Derivation of Criteria Where Dilution Allowed

As discussed in section IV.C.2.c, above, dilution credits for copper and zinc have been allowed in the calculation of WQBEL's for these hardness-dependent criteria parameters. The allowed copper dilution credit for chronic aquatic life criteria is 14:1, which represents an effluent fraction of 6.7%, and the allowed zinc dilution credit for chronic aquatic life criteria is 0.57:1, which results in an effluent fraction of 64%. These values define the points in the receiving water (i.e., edge of mixing zone) that must be in compliance with aquatic life criteria. When the effluent and receiving water are at their respective minimum hardness values (i.e., 50 mg/L and 44 mg/L as $CaCO_3$,

TENTATIVE ORDER

respectively), and the effluent fraction is 6.7% and 64%, the mixed hardness is 44 mg/L and 47 mg/L (as $CaCO_3$), respectively. An actual observed ambient hardness of 44 mg/L (as $CaCO_3$) has been used in this Order for calculating hardness-dependent copper and zinc chronic criteria based on the minimum ambient hardness value observed during the discharge season when Sacramento River flows were below 350 cfs. Using the ambient hardness to calculate the hardness-dependent metals criteria is consistent with the CTR and the SIP.

Tables F-13 and F-14, below, demonstrate that protective effluent limitations result when using this approach for determining the appropriate hardness. In this example the mixed receiving water copper and zinc concentrations do not exceed the mixed CTR criteria for copper and zinc at the edge of the mixing zone.

Table F-13. Verification of CTR Compliance for Copper

			Minimum Ambient Background Hardness	**44 mg/L**
			Minimum Effluent Hardness	**50 mg/L**
			Chronic Aquatic Life Dilution Credit	**14:1**
			Maximum Ambient Background Copper Concentration	**1.1 µg/L**
			Effluent Concentration Allowance (ECA) for Copper[1]	**54 µg/L**
Effluent Fraction[2]	**Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions**			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Copper Concentration[3] (µg/L)**	
1.0%	44	4.6	4.6	**Yes**
2.0%	44	4.6	4.6	**Yes**
3.0%	44	4.6	4.6	**Yes**
4.0%	44	4.6	4.6	**Yes**
5.0%	44	4.7	4.6	**Yes**
6.7%	44	4.7	4.6	**Yes**

1 ECA calculated per section 1.4 of the SIP.
2 Table shows effluent fractions ranging from 1% to 6.7% to show conditions outside the approved mixing zone for copper.
3 This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

TENTATIVE ORDER

Table F-14. Verification of CTR Compliance for Zinc

Minimum Ambient Background Hardness				**44 mg/L**
Minimum Effluent Hardness				**50 mg/L**
Chronic Aquatic Life Dilution Credit				**0.57:1**
Maximum Ambient Background Zinc Concentration				**1.2 µg/L**
Effluent Concentration Allowance (ECA) for Zinc[1]				**93 µg/L**
Effluent Fraction[2]	**Downstream Ambient Concentrations Under Worst-Case Ambient Receiving Water Conditions**			**Complies with CTR Criteria?**
	Hardness	**CTR Criteria (µg/L)**	**Ambient Zinc Concentration[3] (µg/L)**	
1.0%	44	60	60	**Yes**
5.0%	44	60	60	**Yes**
15%	45	61	60	**Yes**
25%	46	61	60	**Yes**
50%	47	63	60	**Yes**
64%	48	64	60	**Yes**

1 ECA calculated per section 1.4 of the SIP.

2 Table shows effluent fractions ranging from 1% to 64% to show conditions outside the approved mixing zone for zinc.

3 This concentration is derived using worst-case ambient conditions. These conservative assumptions will ensure that the receiving water always complies with CTR criteria.

3. Determining the Need for WQBEL's

Clean Water Act section 301(b)(1)(C) requires effluent limitations necessary to meet water quality standards, and 40 C.F.R. section 122.44(d) requires NPDES permits to include conditions that are necessary to achieve water quality standards established under section 303 of the CWA, including state narrative criteria for water quality. Federal regulations at 40 C.F.R. section 122.44(d)(1)(i) state, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" Additionally, 40 C.F.R. section 122(d)(1)(vii) requires effluent limits to be developed consistent with any available WLA's developed and approved for the discharge. The process to determine whether a WQBEL is required as described in 40 C.F.R. section 122.44(d)(1)(i) is referred to as an RPA. Central Valley Water Board staff conducted RPA's for nearly 200 constituents, including the 126 U.S. EPA priority toxic pollutants. This section includes details of the RPA's for constituents of concern for the Facility. The entire RPA is included in the administrative record and a summary of the constituents of concern is provided in Attachment G. For priority pollutants, the SIP dictates the procedures for conducting the RPA. For non-priority pollutants the Central Valley Water Board is not restricted to one particular RPA method; therefore, the RPA's have been conducted based on U.S. EPA guidance considering multiple lines of evidence and the site-specific conditions of the discharge.

a. **Constituents with No Reasonable Potential.** WQBEL's are not included in this Order for constituents that do not demonstrate reasonable potential to cause or contribute to an in-stream excursion of an applicable water quality objective;

however, monitoring for those pollutants is established in this Order as required by the SIP. If the results of effluent monitoring demonstrate reasonable potential, this Order may be reopened and modified by adding an appropriate effluent limitation.

Most constituents with no reasonable potential are not discussed in this Order. This section only provides the rationale for the RPA's for the following constituents of concern that were found to have no reasonable potential after assessment of the data:

i. **Salinity**

(a) **WQO.** The Basin Plan contains a chemical constituent objective that incorporates state MCL's, contains a narrative objective, and contains numeric water quality objectives for certain specified water bodies for electrical conductivity, total dissolved solids, sulfate, and chloride. The U.S. EPA National Ambient Water Quality Criteria (NAWQC) for Chloride recommends acute and chronic criteria for the protection of aquatic life. There are no U.S. EPA water quality criteria for the protection of aquatic life for electrical conductivity, total dissolved solids, and sulfate. Additionally, there are no U.S. EPA numeric water quality criteria for the protection of agricultural, livestock, and industrial uses. Numeric values for the protection of these uses are typically based on site-specific conditions and evaluations to determine the appropriate constituent threshold necessary to interpret the narrative chemical constituent Basin Plan objective. The Central Valley Water Board must determine the applicable numeric limit to implement the narrative objective for the protection of agricultural supply. The Central Valley Water Board is currently implementing the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) initiative to develop a Basin Plan Amendment that will establish a salt and nitrate Management Plan for the Central Valley. Through this effort, the Basin Plan will be amended to define how the narrative water quality objective is to be interpreted for the protection of agricultural use. All studies conducted through this Order to establish an agricultural limit to implement the narrative objective will be reviewed by and consistent with the efforts currently underway by CV-SALTS.

Table F-15. Salinity Water Quality Criteria/Objectives

Parameter	Agricultural WQ Objective[1]	Secondary MCL[2]	U.S. EPA NAWQC	Effluent	
				Average[3]	Max
Chloride (mg/L)	Varies	250, 500, 600	860 1-hr 230 4-day	58	71.2
Electrical Conductivity (µmhos/cm) or Total Dissolved Solids (mg/L)	Varies	900, 1,600, 2,200 or 500, 1,000, 1,500	N/A	375 or 235	541 or 278
Sulfate (mg/L)	Varies	250, 500, 600	N/A	18	23.5

TENTATIVE ORDER

Parameter	Agricultural WQ Objective[1]	Secondary MCL[2]	U.S. EPA NAWQC	Effluent	
				Average[3]	Max

1 Narrative chemical constituent objective of the Basin Plan. Procedures for establishing the applicable numeric limitation to implement the narrative objective can be found in the Policy for Application of Water Quality, chapter IV, section 8 of the Basin Plan. However, the Basin Plan does not require improvement over naturally occurring background concentrations. In cases where the natural background concentration of a particular constituent exceeds an applicable water quality objective, the natural background concentration will be considered to comply with the objective.

2 The Secondary MCL's are for protection of public welfare and are stated as a recommended level, upper level, and a short-term maximum level.

3 Maximum calendar annual average.

(1) **Chloride.** The Secondary MCL for chloride is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum. The NAWQC acute criterion for the protection of freshwater aquatic life for chloride is 860 mg/L and the chronic criterion is 230 mg/L.

(2) **Electrical Conductivity or Total Dissolved Solids.** The Secondary MCL for electrical conductivity is 900 µmhos/cm as a recommended level, 1,600 µmhos/cm as an upper level, and 2,200 µmhos/cm as a short-term maximum, or when expressed as total dissolved solids is 500 mg/L as a recommended level, 1,000 mg/L as an upper level, and 1,500 mg/L as a short-term maximum.

(3) **Sulfate.** The Secondary MCL for sulfate is 250 mg/L as a recommended level, 500 mg/L as an upper level, and 600 mg/L as a short-term maximum.

(b) **RPA Results**

(1) **Chloride.** Chloride concentrations in the effluent ranged from 21.1 mg/L to 71.2 mg/L, with a maximum annual average of 58 mg/L based on four samples collected during the discharge season between September 2014 and June 2017. The maximum annual average does not exceed the Secondary MCL recommended level and the maximum effluent chloride concentration of 71.2 mg/L does not exceed the NAWQC criteria for the protection of freshwater aquatic life. The maximum observed receiving water chloride concentration was 1.23 mg/L based on two samples collected during the discharge season between September 2014 and June 2017.

(2) **Electrical Conductivity or Total Dissolved Solids.** A review of the Discharger's monitoring reports shows a maximum observed annual average electrical conductivity of 375 µmhos/cm, with a range from 208 µmhos/cm to 541 µmhos/cm. These levels do not exceed the Secondary MCL recommended level. The maximum observed receiving water electrical conductivity was 111 µmhos/cm based on 109 samples collected during the discharge season from September 2014 through June 2017.

Total dissolved solids concentrations in the effluent ranged from 138 mg/L to 278 mg/L, with a maximum annual average of 235 mg/L

based on four samples collected during the discharge season from September 2014 through June 2017. These levels do not exceed the Secondary MCL recommended level. The maximum observed receiving water total dissolved solids concentration was 69 mg/L based on three samples collected during the discharge season from September 2014 through June 2017.

(3) **Sulfate.** Sulfate concentrations in the effluent ranged from 10.9 mg/L to 23.5 mg/L, with a maximum annual average of 18 mg/L, based on four samples collected during the discharge season from September 2014 through June 2017. These levels do not exceed the Secondary MCL recommended level. The maximum observed receiving water sulfate concentration was 1.8 mg/L based on two samples collected during the discharge season from September 2014 through June 2017.

Based on the relatively low levels of salinity, the discharge does not have a reasonable potential to cause or contribute to an in-stream excursion above applicable water quality objectives. However, since the Discharger discharges to the Sacramento River, a tributary of the Sacramento-San Joaquin Delta, of additional concern is the salt contribution to Delta waters. Allowing the Discharger to increase its current salt loading may be contrary to the Region-wide effort to address salinity in the Central Valley. Therefore, in order to ensure the Discharger will continue to control the discharge of salinity, this Order requires the Discharger to continue to implement a salinity evaluation and minimization plan.

ii. **Settleable Solids**

(a) **WQO.** For inland surface waters, the Basin Plan states that "*[w]ater shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.*" Order R5-2012-0085 contained an average monthly effluent limitation (AMEL) and maximum daily effluent limitation (MDEL) for settleable solids based on the Basin Plan's narrative objective.

(b) **RPA Results.** Settleable solids were not detected in the effluent based on 744 samples collected during the discharge season from September 2014 through June 2017. Therefore, the Central Valley Water Board finds the discharge does not have reasonable potential to cause or contribute to an exceedance in the receiving water and the Facility is adequately controlling the discharge of settleable solids. Since the discharge does not demonstrate reasonable potential, the effluent limitations for settleable solids have not been retained in this Order. Removal of these effluent limitations is in accordance with federal anti-backsliding regulations (see section IV.D.3 of the Fact Sheet).

iii. **Nitrate and Nitrite**

WQO. The State Water Board, Division of Drinking Water (DDW) has adopted Primary MCL's for the protection of human health for nitrite and nitrate that are equal to 1.0 mg/L and 10 mg/L (measured as nitrogen), respectively. DDW has also adopted a Primary MCL of 10 mg/L for the sum of nitrate and nitrite, measured as nitrogen. U.S. EPA has developed a Primary MCL and an MCL goal of 1.0 mg/L for nitrite (measured as

nitrogen). For nitrate, U.S. EPA has developed Drinking Water Standards (10 mg/L as Primary MCL) and NAWQC for protection of human health (10 mg/L for non-cancer health effects).

(a) **RPA Results.** Nitrate concentrations in the effluent ranged from ND to 6.74 mg/L based on 36 monthly samples. The MEC for nitrate is below the Primary MCL. Nitrite concentrations in the effluent ranged from ND (4 samples) to 0.074 mg/L based on 11 samples. The MEC for nitrite is below the Primary MCL. Therefore, the Central Valley Water Board finds the discharge does not have reasonable potential to cause or contribute to an exceedance in the receiving water and the Facility is adequately controlling the discharge of nitrate and nitrite. Since the discharge does not demonstrate reasonable potential, the effluent limitation for nitrate plus nitrite has not been retained in this Order. Removal of this effluent limitation is in accordance with federal anti-backsliding regulations (see section IV.D.3 of the Fact Sheet).

b. **Constituents with No Data or Insufficient Data.** Reasonable potential cannot be determined for the following constituents because effluent data are limited or ambient background concentrations are not available. The Discharger is required to continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further analysis will be conducted to determine whether to add numeric effluent limitations or to continue monitoring.

i. **Bis (2-Ethylhexyl) Phthalate**

(a) **WQO.** The CTR includes a criterion of 1.8 µg/L for bis (2-ethylhexyl) phthalate for the protection of human health for waters from which both water and organisms are consumed.

(b) **RPA Results.** Based on effluent data collected during the discharge season from September 2014 through June 2017, bis (2-ethylhexyl) phthalate was detected but not quantified (DNQ) at an estimated concentration of 1.9 µg/L and detected at a concentration of 4.1 µg/L in samples collected on 20 April 2016 and 29 December 2016, respectively. These effluent concentrations exceed the CTR human health criterion for bis (2-ethylhexyl) phthalate.

Bis (2-ethylhexyl) phthalate is commonly used as a plasticizer and, therefore, needs to be sampled with glass containers in order to avoid false positive results. In the ROWD, the Discharger explained that effluent bis (2-ethylhexyl) phthalate samples collected on 20 April 2016 and 29 December 2016 were collected as composite samples and stored in plastic containers within a composite sampling machine. The storage of the effluent samples in the plastic bottles could have led to the increased effluent concentrations of bis (2-ethylhexyl) phthalate observed in the composite samples. The Discharger collected a grab sample for bis (2-ethylhexyl) phthalate in the effluent on 22 March 2017, using a glass bottle, in order to confirm that the use of plastic bottles was causing the elevated results for this constituent. The result of the grab sample was DNQ at an estimated concentration of 1.0 µg/L, which is below the applicable CTR human health criterion.

Section 1.3, step 8 of the SIP allows the Central Valley Water Board to require additional monitoring for a pollutant in place of an effluent limitation if data are unavailable or insufficient. Instead of effluent limitations, monitoring for bis (2-ethylhexyl) phthalate will be required semi-annually during the year 2021 as part of the effluent and receiving water characterization. Should monitoring results indicate that the discharge has the reasonable potential to cause or contribute to an exceedance of a water quality standard, this Order may be reopened and modified by adding an appropriate effluent limitation.

c. **Constituents with Reasonable Potential.** The Central Valley Water Board finds that the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality standard for ammonia, BOD_5, chlorine residual, copper, dichlorobromomethane, pH, total coliform organisms, TSS, and zinc. WQBEL's for these constituents are included in this Order. A summary of the RPA is provided in Attachment G and a detailed discussion of the RPA for each constituent is provided below.

i. **Ammonia**

(a) **WQO.** The 1999 U.S. EPA NAWQC for the protection of freshwater aquatic life for total ammonia (the "1999 Criteria"), recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. U.S. EPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC.

U.S. EPA recently published national recommended water quality criteria for the protection of aquatic life from the toxic effects of ammonia in freshwater (the "2013 Criteria").[1] The 2013 Criteria is an update to U.S. EPA's 1999 Criteria and varies based on pH and temperature. Although the 2013 Criteria reflects the latest scientific knowledge on the toxicity of ammonia to certain freshwater aquatic life, including new toxicity data on sensitive freshwater mussels in the Family Unionidae, the species tested for development of the 2013 Criteria may not be present in some Central Valley waterways. The 2013 Criteria document therefore states that, "*unionid mussel species are not prevalent in some waters, such as the arid west …*" and provides that, "*In the case of ammonia, where a state demonstrates that mussels are not present on a site-specific basis, the recalculation procedure may be used to remove the mussel species from the national criteria data set to better represent the species present at the site.*"

The Central Valley Water Board issued a 3 April 2014 *California Water Code section 13267 Order for Information: 2013 Final Ammonia Criteria for Protection of Freshwater Aquatic Life* (13267 Order) requiring the Discharger to either participate in an individual or group study to determine the presence of mussels or submit a method of compliance for complying with effluent limitations calculated assuming mussels present using the 2013 Criteria. The Discharger submitted a letter to the Central Valley Water Board indicating their participation in the Central Valley

[1] Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, published August 2013 [EPA 822-R-13-001]

Clean Water Association (CVCWA) Freshwater Collaborative Mussel Study. Studies are currently underway to determine how the latest scientific knowledge on the toxicity of ammonia reflected in the 2013 Criteria can be implemented in the Central Valley Region as part of a Basin Planning effort to adopt nutrient and ammonia objectives. Until the Basin Planning process is completed, the Central Valley Water Board will continue to implement the 1999 Criteria to interpret the Basin Plan's narrative toxicity objective. The 1999 Criteria recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. U.S. EPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. U.S. EPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the Sacramento River has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages is well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.

The maximum permitted effluent pH is 8.0 at Discharge Point 001 based on a request submitted by the Discharger prior to the adoption of Order R5-2012-0085. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.0 was used to derive the acute criterion. The resulting acute criterion is 5.62 mg/L.

A chronic criterion was calculated for each day when paired pH and temperature data were measured using downstream receiving water data for pH and temperature. Rolling 30-day average criteria were calculated from downstream receiving water data using the criteria calculated for each day and the minimum observed 30-day average criterion was established as the applicable 30-day average chronic criterion, or 30-day CCC. The most stringent 30-day CCC was 0.24 mg/L (as N) based on downstream receiving water pH and temperature data collected from September 2014 through June 2017. The 4-day average concentration is derived in accordance with the U.S. EPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 0.24 mg/L (as N), the 4-day average concentration that should not be exceeded is 0.60 mg/L (as N).

Elevated pH measurements (greater than 9.0) were observed in the downstream receiving water based on samples collected at Monitoring Location RSW-002 during the discharge season from September 2014 and June 2017, which had a significant influence on the calculation of chronic ammonia criteria. The Discharger provided information to the Central Valley Water Board indicating the presence of algae growth in the vicinity of Monitoring Location RSW-002 and indicated that the receiving water may be subject to varying pH throughout the day, similar to diurnal patterns observed within ponds containing algae cover. Based on a side-by-side analysis of downstream receiving water samples collected at Monitoring Location RSW-002 in the morning compared to samples collected in the afternoon, the Discharger concluded that the pH of

samples taken in the morning are consistently less than the pH of samples taken in the afternoon. The Central Valley Water Board also examined pH samples collected within the Sacramento River upstream of the Facility, including at Mt. Shasta WWTP and the Dunsmuir Railyard, to determine whether or not similar diurnal patterns exist. The Sacramento River pH data collected at the Mt. Shasta WWTP and the Dunsmuir Railyard indicated that similarly timed minimum and maximum pH values occur throughout the year; however, the pH values recorded at these upstream locations were significantly lower than those recorded in the vicinity of the Facility. Additionally, in late 2016, the Discharger recognized that the portable pH probe being utilized did not produce the same result as the pH probe used in the Facility's on-site lab. In response, beginning in 2017, the Discharger switched to measuring receiving water pH with the on-site lab pH probe only. None of the evaluated samples collected at Monitoring Location RSW-002 in 2017 returned pH readings above 9.0.

Due to the uncertainty in the validity of pH results collected at Monitoring Location RSW-002 during the discharge season between September 2014 and June 2017, the Central Valley Water Board has retained the 30-day CCC and 4-day CCC from Order R5-2012-0085 of 3.18 mg/L and 7.95 mg/L, respectively, for the purposes of the RPA and WQBEL calculations for ammonia in this Order.

(b) **RPA Results.** The Facility is a POTW that treats domestic wastewater. Untreated domestic wastewater contains ammonia in concentrations that are harmful to aquatic life and exceed the Basin Plan narrative toxicity objective. Federal regulations at 40 C.F.R. section 122.44(d)(1)(i) require that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Ammonia is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used professional judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

U.S. EPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBEL's are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBEL's for pathogens in all permits for POTW's discharging to contact recreational waters).*" U.S. EPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the*

regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data." With regard to POTW's, U.S. EPA recommends that, "*POTW's should also be characterized for the possibility of chlorine and ammonia problems.*" (TSD, p. 50)

Nitrification is a biological process that converts ammonia to nitrite and nitrite to nitrate. Denitrification is a process that converts nitrate to nitrite or nitric oxide and then to nitrous oxide or nitrogen gas, which is then released to the atmosphere. The Discharger currently uses nitrification to remove ammonia from the waste stream. Inadequate or incomplete nitrification may result in the discharge of ammonia to the receiving stream. Ammonia is known to cause toxicity to aquatic organisms in surface waters. Discharges of ammonia in concentrations that produce detrimental physiological responses to human, plant, animal, or aquatic life would violate the Basin Plan's narrative toxicity objective. Although the Discharger nitrifies the discharge, inadequate or incomplete nitrification creates the potential for ammonia to be discharged and provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC. Therefore, the Central Valley Water Board finds the discharge has reasonable potential for ammonia and WQBEL's are required.

(c) **WQBEL's.** The Central Valley Water Board calculates WQBEL's in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, U.S. EPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC and specifies that "*…the value of "n" (assumed monitoring frequency) used in the AML calculation should not be less than the averaging period upon which the criterion value is based*".[1] Therefore, while the LTA's corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA and AMEL multiplier corresponding to the 30-day CCC was calculated assuming a 30-day averaging period and a monthly sampling frequency (n) of 30. The lowest LTA representing the acute, 4-day CCC, and 30-day CCC is then selected for deriving the AMEL and the average weekly effluent limitation (AWEL). The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures.

The receiving water contains assimilative capacity for ammonia; therefore, as discussed in section IV.C.2.c, an acute aquatic life dilution credit of 9:1 and a chronic aquatic life dilution credit of 14:1 were allowed in the development of WQBEL's for ammonia. Based on the allowable dilution credits, this Order retains the AMEL of 22 mg/L from Order R5-2012-0085 and establishes an AWEL of 45 mg/L based on the NAWQC.

(d) **Plant Performance and Attainability.** Based on the analysis of existing effluent data, the Central Valley Water Board concludes that immediate

[1] 64 FR 71974

compliance with the performance-based WQBEL's for ammonia is feasible.

ii. **Chlorine Residual**

(a) **WQO.** U.S. EPA developed NAWQC for the protection of freshwater aquatic life for chlorine residual. The recommended 4-day average (chronic) and 1-hour average (acute) criteria for chlorine residual are 0.011 mg/L and 0.019 mg/L, respectively. These criteria are protective of the Basin Plan's narrative toxicity objective.

(b) **RPA Results.** The concentrations of chlorine used to disinfect wastewater are high enough to harm aquatic life and violate the Basin Plan narrative toxicity objective if discharged to the receiving water. Reasonable potential, therefore, does exist and effluent limits are required.

Federal regulations at 40 C.F.R. section 122.44(d)(1)(i) require that, "*Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality.*" For priority pollutants, the SIP dictates the procedures for conducting the RPA. Chlorine is not a priority pollutant. Therefore, the Central Valley Water Board is not restricted to one particular RPA method. Due to the site-specific conditions of the discharge, the Central Valley Water Board has used its judgment in determining the appropriate method for conducting the RPA for this non-priority pollutant constituent.

U.S. EPA's September 2010 NPDES Permit Writer's Manual, page 6-30, states, "*State implementation procedures might allow, or even require, a permit writer to determine reasonable potential through a qualitative assessment process without using available facility-specific effluent monitoring data or when such data are not available…A permitting authority might also determine that WQBEL's are required for specific pollutants for all facilities that exhibit certain operational or discharge characteristics (e.g., WQBEL's for pathogens in all permits for POTW's discharging to contact recreational waters).*" U.S. EPA's TSD also recommends that factors other than effluent data should be considered in the RPA, "*When determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a numeric or narrative water quality criterion for individual toxicants or for toxicity, the regulatory authority can use a variety of factors and information where facility-specific effluent monitoring data are unavailable. These factors also should be considered with available effluent monitoring data.*" With regard to POTW's, U.S. EPA recommends that, "*POTW's should also be characterized for the possibility of chlorine and ammonia problems.*" (TSD, p. 50)

The Discharger uses chlorine for disinfection, which is extremely toxic to aquatic organisms. Although the Discharger uses a sulfur dioxide process to dechlorinate the effluent prior to discharge to the Sacramento River, the existing chlorine use and the potential for chlorine to be discharged

provides the basis for the discharge to have a reasonable potential to cause or contribute to an in-stream excursion above the NAWQC.

(c) **WQBEL's.** The TSD contains statistical methods for converting chronic (4-day) and acute (1-hour) aquatic life criteria to AMEL's and MDEL's based on the variability of the existing data and the expected frequency of monitoring. However, because chlorine is an acutely toxic constituent that can and will be monitored continuously, an average 1-hour limitation is considered more appropriate than an average daily limitation. This Order contains a 4-day average effluent limitation and 1-hour average effluent limitation for chlorine residual of 0.011 mg/L and 0.019 mg/L, respectively, based on U.S. EPA's NAWQC, which implements the Basin Plan's narrative toxicity objective for the protection of aquatic life.

(d) **Plant Performance and Attainability.** The Discharger uses sulfur dioxide to dechlorinate the effluent prior to discharge to the Sacramento River. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

iii. **Copper**

(a) **WQO.** The CTR includes hardness-dependent criteria for the protection of freshwater aquatic life for copper. These criteria for copper are presented in dissolved concentrations, as 1-hour acute criteria and 4-day chronic criteria. U.S. EPA recommends conversion factors to translate dissolved concentrations to total concentrations. Default U.S. EPA translators were used for the effluent and receiving water. As described in section IV.C.2.e of this Fact Sheet, the applicable acute and chronic criteria for copper in the effluent are 6.5 µg/L and 4.6 µg/L, respectively, as total recoverable.

The Basin Plan includes a site-specific, hardness-dependent, maximum concentration water quality objective for the Sacramento River and its tributaries above the State Highway 32 Bridge at Hamilton City. Using U.S. EPA conversion factors and the selected ambient hardness described in section IV.C.2.e of this Fact Sheet, the applicable Basin Plan maximum concentration objective for copper in the effluent is 6.4 µg/L, as total recoverable.

Footnote 4, page 3 of the Introduction of the SIP states, "*If a water quality objective and a CTR criterion are in effect for the same priority pollutant, the more stringent of the two applies.*" The Basin Plan objective cannot be directly compared to the CTR criteria to determine the most stringent objective because they have different averaging periods and the CTR criteria vary with hardness. In this situation, the RPA has been conducted considering both the CTR criteria and the Basin Plan site-specific objective. Order R5-2012-0085 included effluent limitations for copper based on the CTR criteria and the Basin Plan maximum concentration objective.

(b) **RPA Results.** The maximum effluent concentration (MEC) for copper in the effluent was 20.6 µg/L (as total recoverable) based on 17 samples collected during the discharge season from September 2014 through June 2017. The maximum observed upstream receiving water concentration was 1.1 µg/L (as total recoverable) based on six samples collected from September 2014 through June 2017. Therefore, copper in the discharge